Variability enhancement in the Mekong river flood regime: implications for modeling

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The non-stationary general extreme value function and the wavelet power spectrum are used to highlight periods of variability enhancements and possible variability trends over the past century in four stations in the Mekong river, in southeast Asia. According to the models used, increases in variability are found that influence the estimated probability of extreme discharges in the last quarter of the 20th century, contrary to a detected decrease in the mean of annual maximum discharges. The periods of enhanced variability of the hydrological variables and of large-scale circulation patterns, such as the Western North-Pacific monsoon, match in time and frequency. The precipitation field over the basin also indicate a strong connection of the basin's southeastern region with the Western North-Pacific monsoon.

Variability trends or periods of enhancement in the Mekong river flood regime are therefore fundamental aspects of any framework for simulating the hydrological regime on this region. Aiming at the calibration of a hydrological model that is able to simulate changes in flood variability, the frequency modes obtained by the wavelet power spectrum that most contribute to increases in variability are identified. Then, based on a previous calibration of the SWAT model for the Mekong river, a sensitivity analysis is performed to evaluate which model parameters most influence the identified frequency bands. This will allow to focus on the hydrological consequences of changes in climate variability, rather than of changes in means.